LaMotte

Water Quality Assessment

Overview Topics

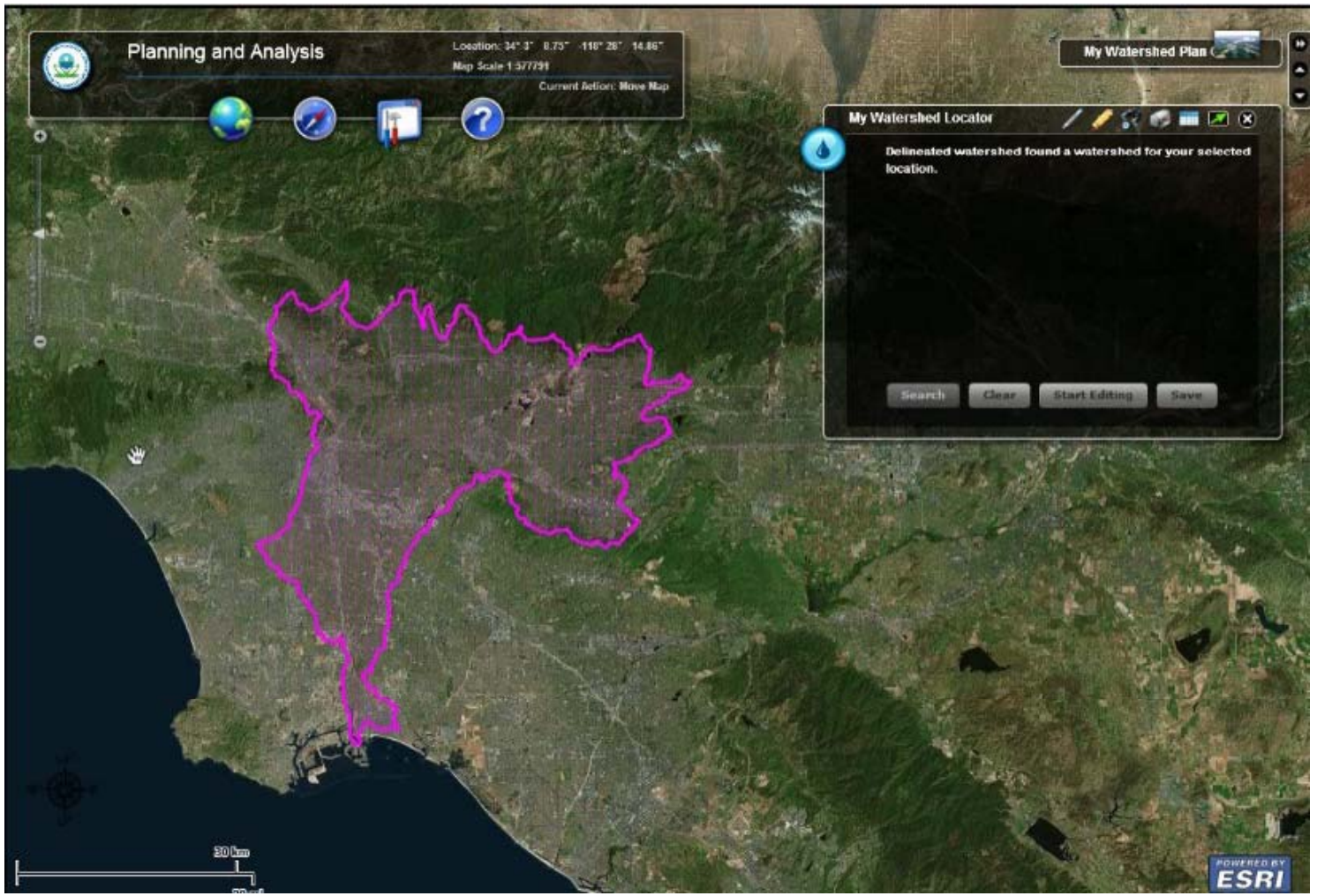
Watersheds

Everyone lives in a watershed. A watershed is an area of land where all of the water that is under the land or drains off the land flows downhill to the same place – a common waterway. Water quality is affected by how the surrounding land is used and, because water moves throughout a watershed, natural and human activities that affect the water quality upstream in the watershed can affect the water quality downstream.

Topographic Map

- Large scale map
- Elevation is shown in three dimensions
- Shows natural and manmade features
- Shows small streams as well as large water bodies
- Used to estimate watershed boundaries

You can identify your local watershed on internet websites.


Planning and Analysis
Location: 34° 3' 8.75" -118° 28' 14.86"
Map Scale 1:577791
Current Action: Move Map
My Watershed Plan
My Watershed Locator
Delineated watershed found a watershed for your selected location.
Search
Clear
Start Editing
Save
30 km
POWERED BY ESRI

Pollution

The Environmental Protection Agency defines pollution as…

“Any substance that exists in the environment that is undesirable or harmful to that environment”

The Water Quality Index (WQI)

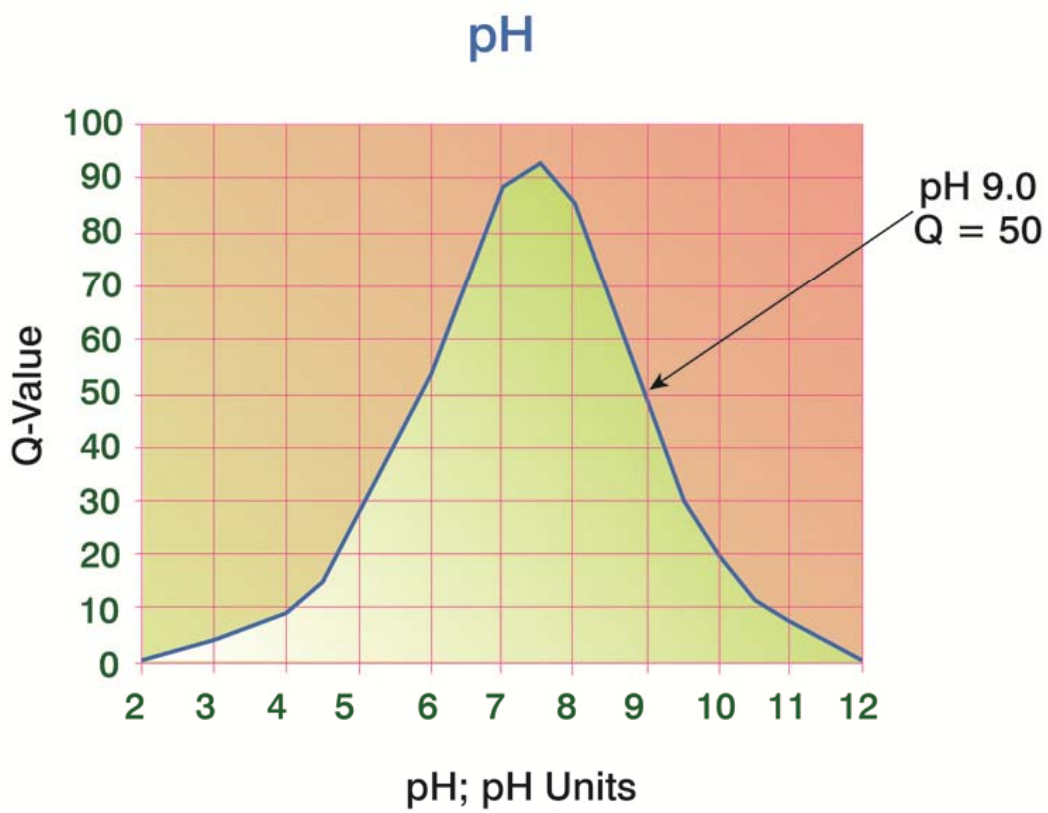
- Developed by the EPA
- Dimensionless number
- Determines overall water quality
- Compare water quality at multiple sites
- Detect water quality trends
- Identify areas of water quality problems

Calculating the WQI

1. Nine physical, chemical, and microbiological parameters are measured:

    - Dissolved Oxygen
    - Fecal Coliform
    - Biochemical Oxygen Demand
    - pH
    - Temperature Change
    - Nitrate
    - Phosphate
    - Turbidity
    - Total Dissolved Solids

2. Each test result is transferred to a weighting curve where a numerical value, or Q-value, is obtained.



A weighting factor is a mathematical value that sets the relative importance of the parameter to the overall water quality.

3. The nine resulting Q-values are used to calculate the Water Quality Index for the sampling site.

The Water Quality Index scale ranges from 1 to 100, with higher numbers indicating better water quality.

Water Quality Index Worksheet

Parameter	Test Result	Units	Q-value	Weighting Factor	Weighted Q-Value
DO	100	% Saturation	99	0.17	16.8
Fecal Coliform	500,000	CFU/100 mL	2	0.16	0.3
BOD	16.8	mg/L	15	0.11	1.7
pH	6.4	pH units	64	0.11	7.0
Temp Change	0.5	°C	90	0.10	9.0
Nitrate	9.4	mg/L NO_3	53	0.10	5.3
Phosphate	0.4	mg/L PO_4	72	0.10	7.2
Turbidity	24	NTU	57	0.08	4.6
TDS	218	mg/L	71	0.07	5.0
				Water Quality Index =	56.9
				Water Quality Rating =	Average

WQI Rating	
WQI	Rating
0-25	Poor
26-50	Fair
51-70	Average
71-90	Good
91-100	Excellent

Water Quality Assessment Curriculum Package

- Thermometer
- Dissolved Oxygen Kit
- pH Kit
- Nitrate-Nitrogen Kit
- Phosphate Kit
- Turbidity Kit
- Alkalinity Kit
- Salt/TDS/Temp Tracer
- Nutrient – TTC/MacConkey BioPaddles®
- Water Quality Index CD

Unique Feature!

Nutrient TTC/MacConkey BioPaddles® for coliform testing

- No Petri dishes
- No inoculating loops
- No Bunsen burners
- No refrigeration
- Faster
- SAFER

The exploration of the Water Quality Index teaches students STEM-based skills:

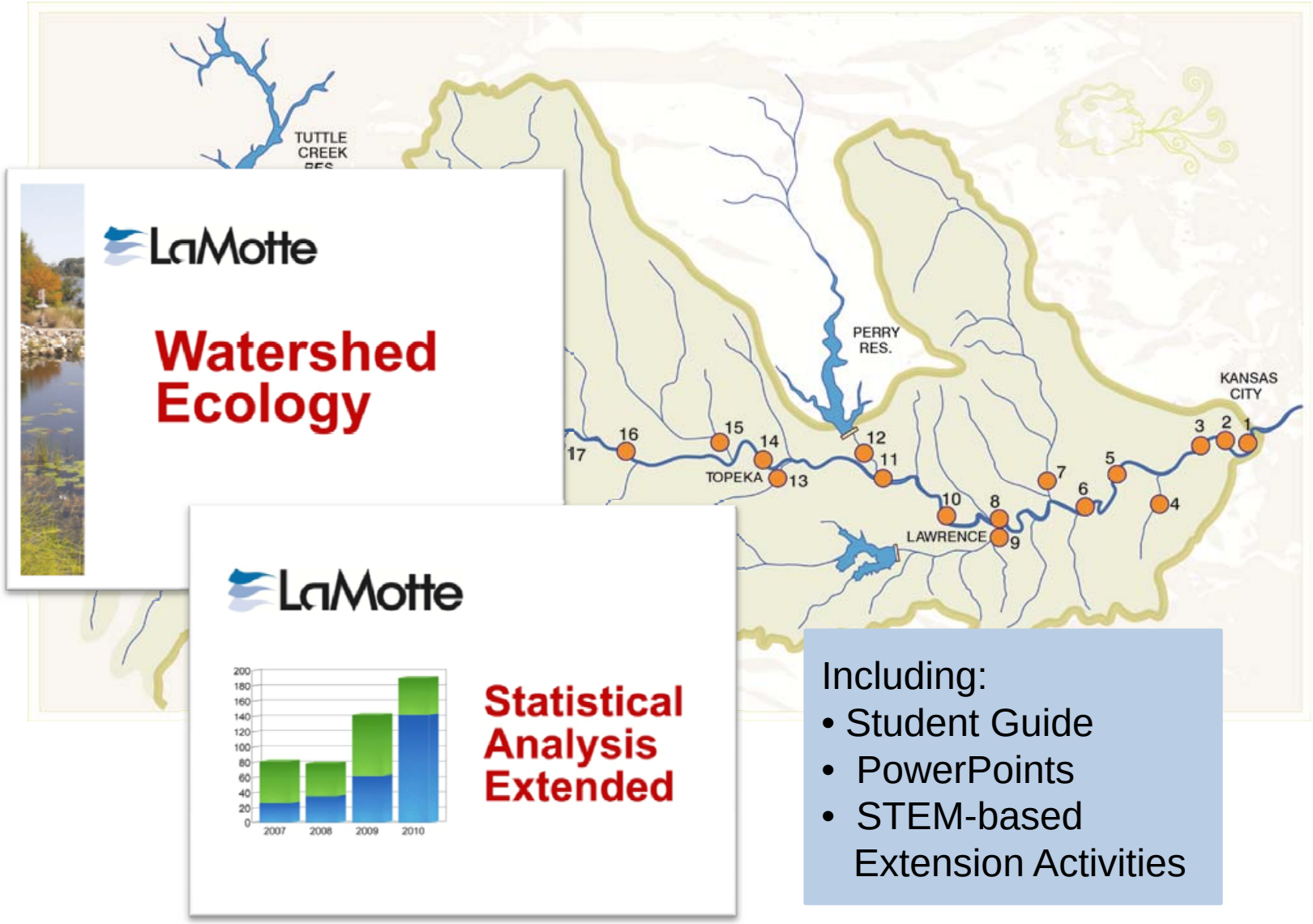
- Analytical skills - research a topic, develop a plan, draw conclusions
- Organization skills – record data
- Science skills - recognize cause and effect, use facts to prove a hypothesis
- Leadership skills – work as a team
- Mathematic skills – measurements and calculations
- Attention to detail - follow procedures, record data
- Technical skills - troubleshoot problems, build equipment, utilize internet sites
- Creative abilities - solve problems, design equipment
- Communication skills - interact within teams, pool class data, prepare reports

Skills will be applied to four classroom activities and one field activity…

Classroom activities use EPA data from Kansas River Sites

Activity 1	Determine the Water Quality Index for the Kansas River Watershed
Activity 2	Do Water Quality Values Change over a 24 Hour Period?
Activity 3	Do Water Quality Values Change Within a Watercourse Cross-Section?
Activity 4	Environmental Impacts on Mill Creek Tributary

1. Students review background materials



Including:

- Student Guide
- PowerPoints
- STEM-based Extension Activities

2. Students create spreadsheets with the reported data to calculate the Water Quality Index …

KANSAS CITY - STATION 1 - 24 HOUR DATA
SS2

Date	Station	Mile Marker	Location	Time	Weather Observations	Flow	DO	Fecal Coli	BOD_5	pH	Temp (Loc 1)	Temp (Loc 2)	Nitrate	Phosphate	Turbidity	TDS
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	2:00	Clear skies; -2°C	1980	10.8	2,000	8.3	7.7	9.5	9.5	2.000	0.56	20	450
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	4:00	Clear skies; -2°C	1980	10.8	2,000	7.6	7.7	9.5	9.5	2.000	0.43	17	435
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	6:00	Clear skies; 0°C	1980	10.6	1,000	8.9	7.8	9.5	9.5	2.000	0.80	15	460
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	8:00	Clear skies; 1°C	1970	11.0	3,000	8.9	8.0	9.0	9.0	2.000	0.43	13	475
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	10:00	Light Rain; 3°C	1940	10.1	5,000	8.3	7.8	9.0	9.0	2.000	0.61	22	435
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	12:00	Light Rain; 4°C	1940	11.1	2,500	7.6	8.0	9.0	9.0	2.000	0.13	51	425
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	14:00	Drizzle; 5°C	1960	11.1	8,000	6.4	7.7	9.0	9.0	2.000	0.62	38	458
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	16:00	Clear skies; 6°C	1980	11.1	5,000	6.4	8.0	9.0	9.0	2.000	0.46	30	440
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	18:00	Clear skies; 5°C	1930	10.7	2,500	7.3	8.0	8.5	8.5	2.000	0.59	34	435
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	20:00	Clear skies; 3°C	1930	13.8	5,000	8.0	7.8	9.0	9.0	2.000	0.44	25	470
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	22:00	Clear skies; 2°C	1900	10.4	1,000	7.9	8.0	9.0	9.0	2.000	0.55	25	425
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	0:00	Clear skies	1910	10.2	5,000	8.3	7.8	9.0	9.0	2.000	0.43	25	440

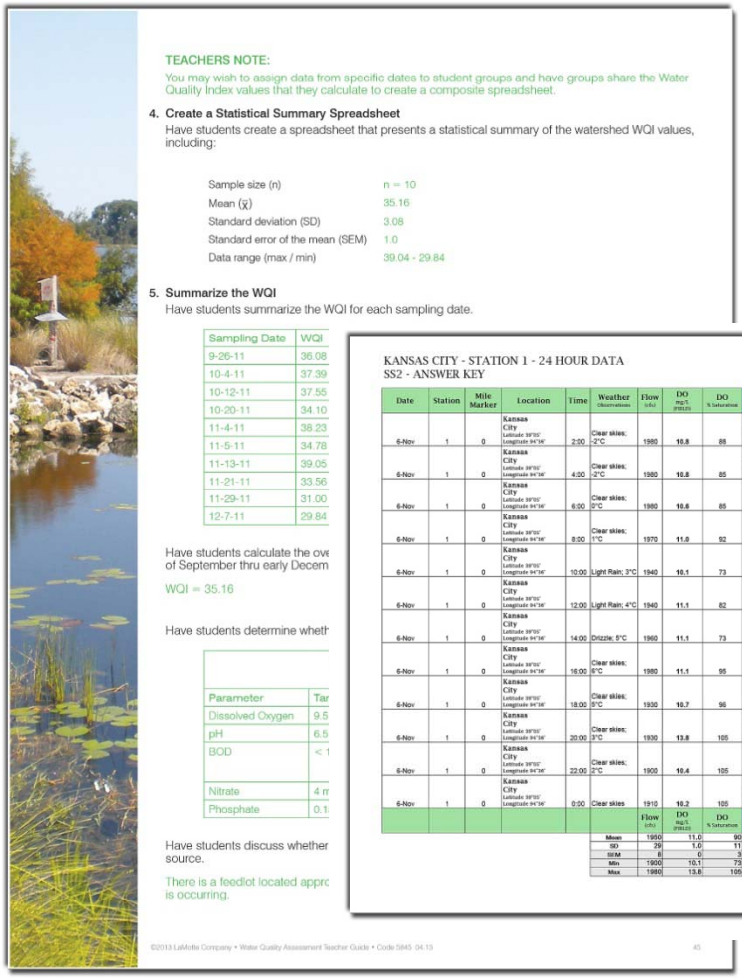
…and analyze the data and create graphs to answer questions such as:

- Based on the sampling data, can any conclusions be drawn regarding sampling time?
- Does the data show a significant difference in water quality over time?
- Based on the reported data, can rainfall influence the Water Quality Index?
- What water quality target parameters fell outside of the target values?

And discuss:

- What are the possible reasons for water quality variances?
- What would be a possible plan for future sampling that might yield more significant data?
- How would you design a study that would provide additional guidance regarding river and stream sampling points?

Completed spreadsheets and answers to questions are provided in the Teacher Guide



TEACHERS NOTE:

You may wish to assign data from specific dates to student groups and have groups share the Water Quality Index values that they calculate to create a composite spreadsheet.

4. **Create a Statistical Summary Spreadsheet**

Have students create a spreadsheet that presents a statistical summary of the watershed WQI values, including:

Sample size (n)	n = 10
Mean ($\bar{x}$)	35.16
Standard deviation (SD)	3.08
Standard error of the mean (SEM)	1.0
Data range (max / min)	39.04 - 29.84

5. **Summarize the WQI**

Have students summarize the WQI for each sampling date.

Sampling Date	WQI
9-26-11	36.08
10-4-11	37.39
10-12-11	37.55
10-20-11	34.10
11-4-11	38.23
11-5-11	34.78
11-13-11	39.05
11-21-11	33.56
11-29-11	31.00
12-7-11	29.84

Have students calculate the ove
of September thru early Decem

WQI = 35.16

Have students determine whet

Parameter	Tar
Dissolved Oxygen	9.5
pH	6.5
BOD	< 1
Nitrate	4 m
Phosphate	0.1

Have students discuss whether
source.

There is a feedlot located appro
is occurring.

KANSAS CITY - STATION 1 - 24 HOUR DATA
SS2 - ANSWER KEY

Date	Station	Mile Marker	Location	Time	Weather Observations	Flow (cfs)	DO mg/L (FIELD)	DO % Saturation	Q	Fecal Coli CFU/100 ml (FIELD)	Q	BOD_5 mg/L	Q	pH	Q	Temp (°C) Low -1	Temp (°C) Low -2	Temp (°C) Hi T	Q	Nitrate mg/L NO_3	Q	Phosphate mg/L PO_4	Q	Turbidity JTU	Q	TDS ppm	Q	WQI	WQ Rating
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	2:00	Clear skies; -2°C	1980	10.8	88	92.40	2,000	18.00	8.3	41.14	7.7	89.80	9.5	9.5	0.0	92.00	2.000	88.40	0.56	65.96	20	60.00	450	39.00	65.16	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	4:00	Clear skies; -2°C	1980	10.8	85	90.75	2,000	18.00	7.6	44.08	7.7	89.80	9.5	9.5	0.0	92.00	2.000	88.40	0.43	73.63	17	65.40	435	41.40	66.57	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	6:00	Clear skies; 0°C	1980	10.6	85	90.75	1,000	22.00	8.9	38.62	7.8	88.20	9.5	9.5	0.0	92.00	2.000	88.40	0.80	51.80	15	69.00	460	37.40	64.26	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	8:00	Clear skies; 1°C	1970	11.0	92	94.60	3,000	15.79	8.9	38.62	8.0	85.00	9.0	9.0	0.0	92.00	2.000	88.40	0.43	73.63	13	72.60	475	35.00	65.87	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	10:00	Light Rain; 3°C	1940	10.1	73	77.50	5,000	13.00	8.3	41.14	7.8	88.20	9.0	9.0	0.0	92.00	2.000	88.40	0.61	63.01	22	58.60	435	41.40	61.41	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	12:00	Light Rain; 4°C	1940	11.1	82	89.10	2,500	16.78	7.6	44.08	8.0	85.00	9.0	9.0	0.0	92.00	2.000	88.40	0.13	91.33	51	37.60	425	43.00	65.22	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	14:00	Drizzle; 5°C	1960	11.1	73	77.50	6,000	10.97	6.4	49.12	7.7	89.80	9.0	9.0	0.0	92.00	2.000	88.40	0.62	62.42	38	47.40	458	37.72	60.93	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	16:00	Clear skies; 6°C	1980	11.1	95	96.25	5,000	13.00	6.4	49.12	8.0	85.00	9.0	9.0	0.0	92.00	2.000	88.40	0.46	71.86	30	53.00	440	40.60	65.50	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	18:00	Clear skies; 5°C	1930	10.7	96	96.80	2,500	16.78	7.3	45.34	8.0	85.00	8.5	8.5	0.0	92.00	2.000	88.40	0.59	64.19	34	50.20	435	41.40	64.85	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	20:00	Clear skies; 3°C	1930	13.8	105	96.75	5,000	13.00	8.0	42.40	7.8	88.20	9.0	9.0	0.0	92.00	2.000	88.40	0.44	73.04	25	56.50	470	35.80	65.26	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	22:00	Clear skies; 2°C	1900	10.4	105	96.75	1,000	22.00	7.9	42.62	8.0	85.00	9.0	9.0	0.0	92.00	2.000	88.40	0.55	66.55	25	56.50	425	43.00	66.25	AVERAGE
6-Nov	1	0	Kansas City Latitude 39°05' Longitude 94°36'	0:00	Clear skies	1910	10.2	105	96.75	5,000	13.00	8.3	41.14	7.8	88.20	9.0	9.0	0.0	92.00	2.000	88.40	0.43	73.63	25	56.50	440	40.60	65.52	AVERAGE
						Flow (cfs)	DO mg/L (FIELD)	DO % Saturation	Q	Fecal Coli CFU/100 ml (FIELD)	Q	BOD_5 mg/L	Q	pH	Q	Temp (°C) Low -1	Temp (°C) Low -2	Temp (°C) Hi T	Q	Nitrate mg/L NO_3	Q	Phosphate mg/L PO_4	Q	Turbidity JTU	Q	TDS ppm	Q	WQI	WQ Rating
					Mean	1950	11.0	90	91.33	3,500	16.03	7.8	43.14	7.9	87.27	9.1	9.1	0.0	92.00	2.000	88.40	0.50	69.25	26	56.94	446	39.69	64.73	AVERAGE
					SD	29	1.0	11	7.02	2,100	3.60	0.8	3.46	0.1	2.10	0.3	0.3	0.0	0.00	0.000	0.00	0.16	9.53	11	9.54	17	2.68	1.78		
					SEM	6	0	3	2.0	606	1.0	0	1.0	0	0.6	0	0	0	0.0	0.000	0.0	0.0	2.8	3	2.8	5	0.8	0.5		
					Min	1900	10.1	73	77.50	1,000	10.97	6.4	38.62	7.7	85.00	8.5	8.5	0.0	92.00	2.000	88.40	0.13	51.80	13	37.60	425	35.00	60.93		
					Max	1980	13.8	105	96.80	6,000	22.00	8.9	49.12	8.0	89.80	9.5	9.5	0.0	92.00	2.000	88.40	0.80	91.33	51	72.60	475	43.00	66.57		

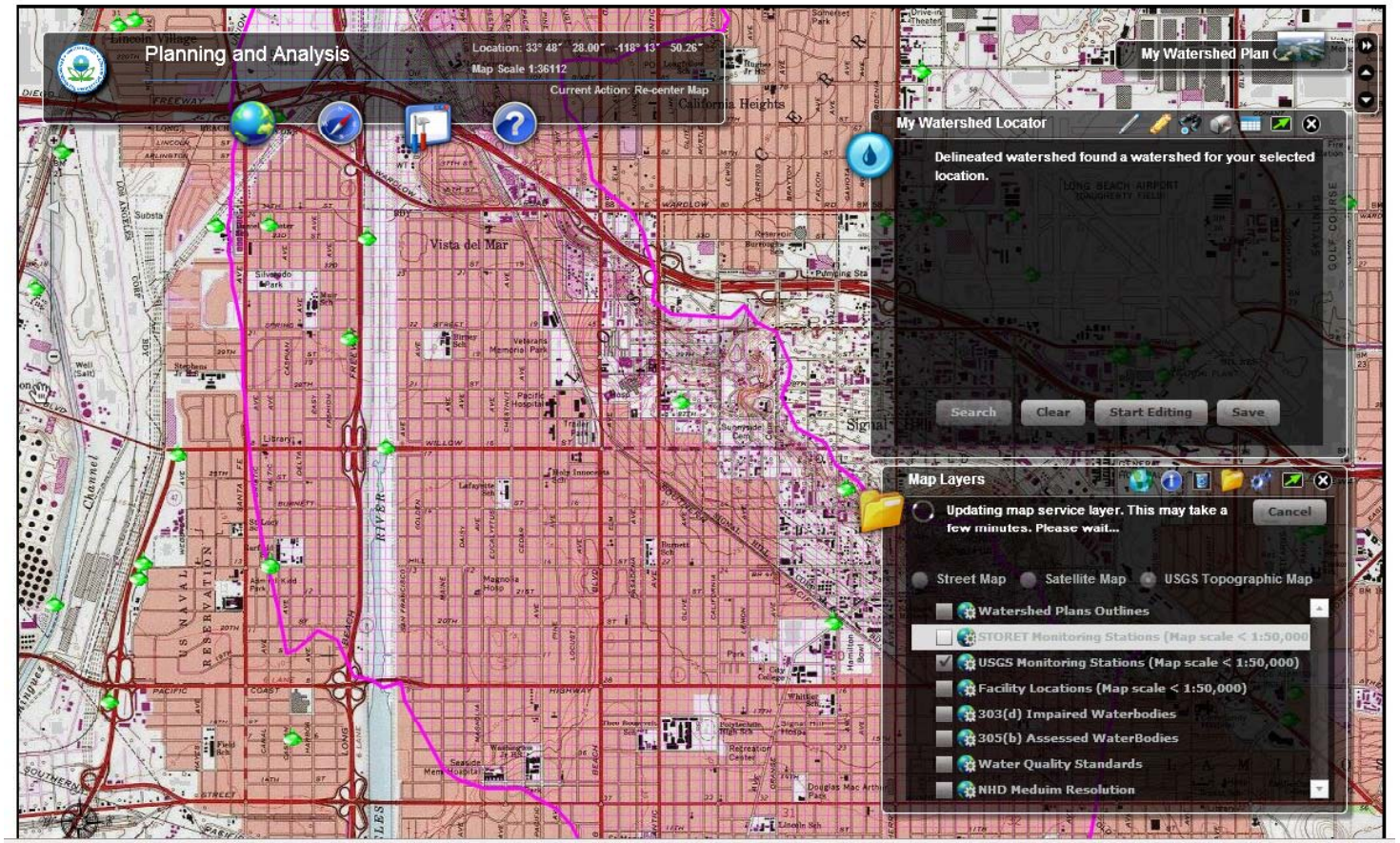
Activity 5

Investigate Water Quality in a Local Watershed

Field Activity

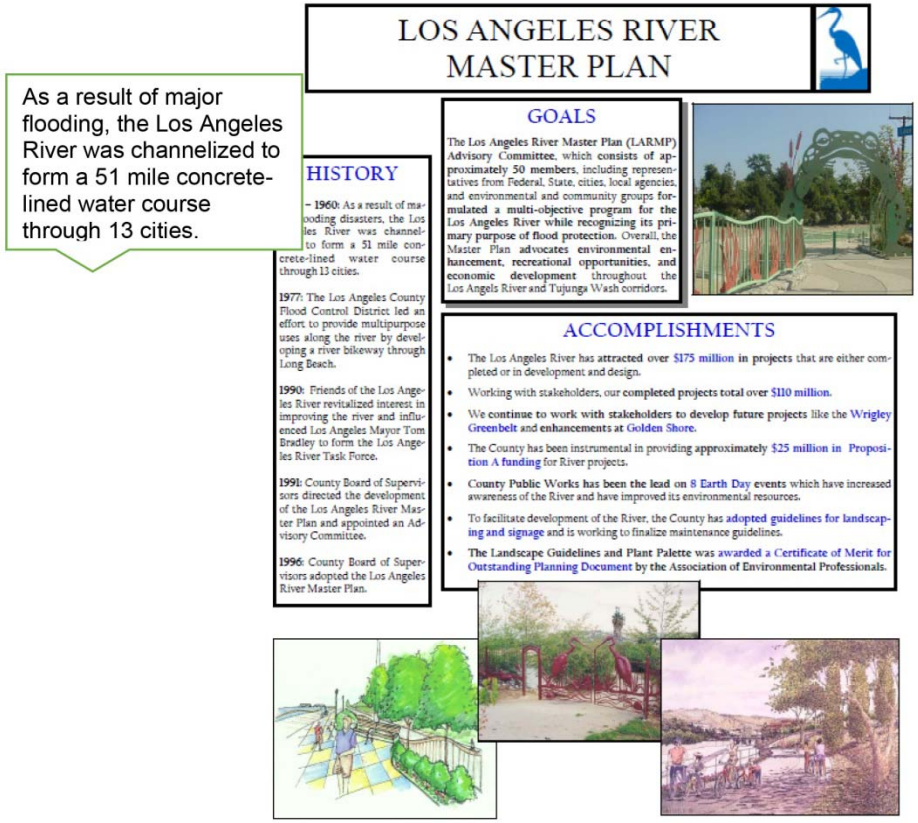
Identify a Local Watershed

Students do a search or use links to internet resources to identify a local watershed and determine the local watershed boundary.

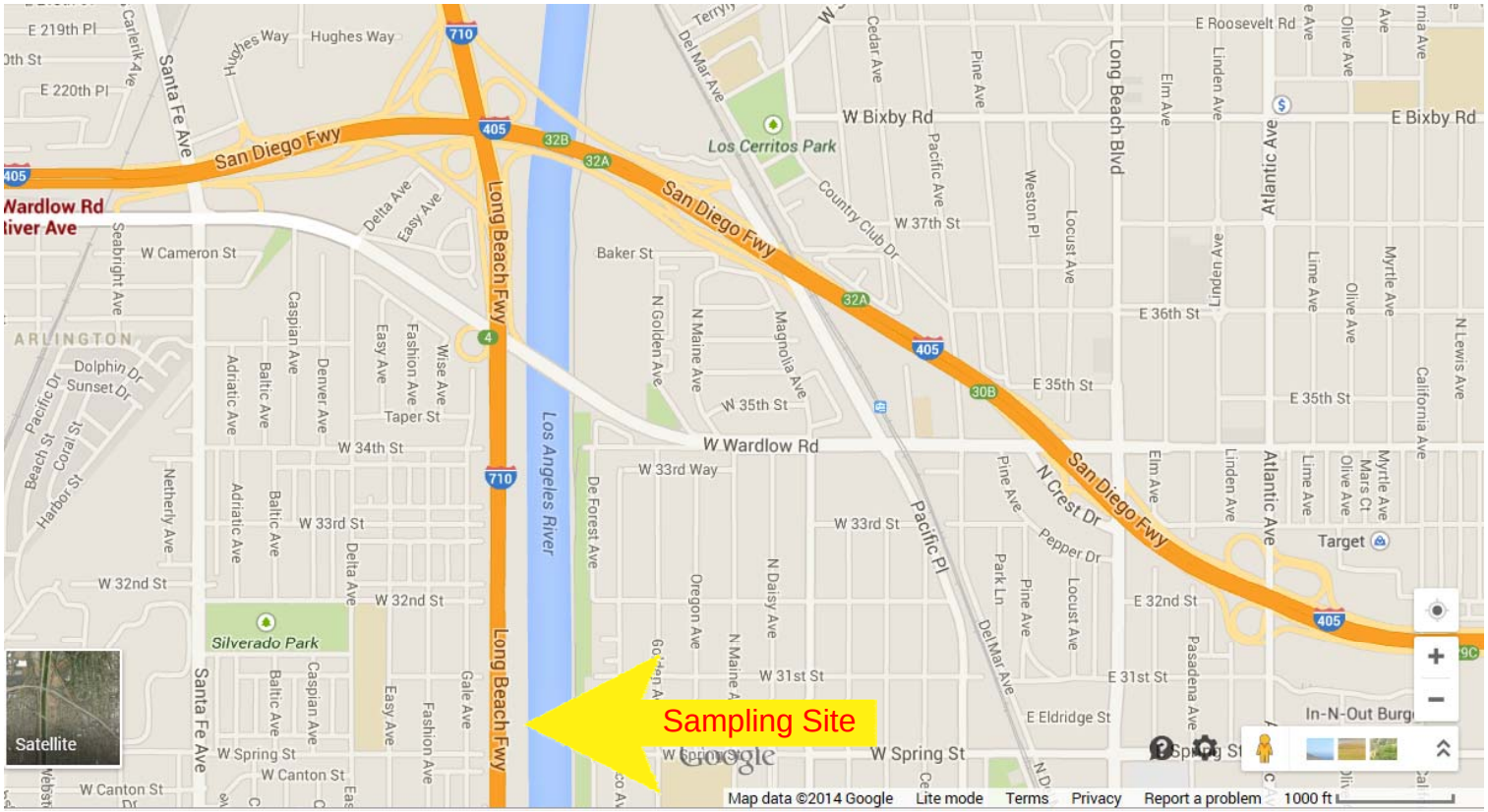


Student explore internet sites to research more about the site:

- Land Use (GIS)
- Water quality data from citizen monitoring groups
- Weather events
- Water quality data for nearby monitoring stations



Students choose a sampling site, ….



… list possible point and nonpoint pollution sources,…

- Urban runoff
- Sewage
- Industrial wastewater
- Thermal pollution
- Debris from upstream
- Secondary-treated effluent
- Waste discharges

…and use satellite photos from internet sites to document the sampling location.

Collect a Water Sample

Students collect a sample at the site

…or a sample can be brought to the classroom.

Test The Water Sample

Students groups follow the Field Test Procedures to obtain a test result for the nine parameters that are used to calculate the Water Quality Index.

MEASURE

DISSOLVED OXYGEN (DO)

WARNING! This set contains chemicals that may be harful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

For use with: LaMotte Dissolved Oxygen Kit (Code 5860-01) See Resources for link to complete test kit instructions including EPA compliance requirements and chemical reactions

Oxygen is critical to the survival of aquatic plants and animals, and a shortage of dissolved oxygen is not only a sign of pollution, it is harmful to fish. Some aquatic species are more sensitive to oxygen depletion than others, but some general guidelines to consider when analyzing test results are:

5-6 ppm	Sufficient for most species
<3 ppm	Stressful to most aquatic species
<2 ppm	Fatal to most species

Because of its importance to the fish's survival, aquaculturists, or "fish farmers," and aquarists use the dissolved oxygen test as a primary indicator of their system's ability to support healthy fish.

The oxygen found in water comes from many sources, but the largest source is oxygen that is absorbed from the atmosphere. Wave action and splashing allows more oxygen to be absorbed into the water. A second major source of oxygen is aquatic plants, including algae. During photosynthesis plants remove carbon dioxide from the water and replace it with oxygen.

Oxygen is continuously moving between the water and surrounding air. The direction and speed of this movement is dependent upon the amount of contact between the air and water. A tumbling mountain stream or windswept, wave-covered lake, where more of the water's surface is exposed to the air, will absorb more oxygen from the air than a calm, smooth body of water. This is why aerators: by creating bubbles and waves th... increased and more oxygen can enter the w...

Photosynthesis

In the leaves of plants, one of the most imp... processes on Earth is constantly occurring...

During daylight, plants constantly take car... the air, and in the presence of water conve... and carbohydrates, which are used to pro... plant material. Since photosynthesis requ... do not photosynthesize at night, so no or...

Chemically, the photosynthesis reaction ...

Light + nCO_2 + nH_2O ⟶ (C_n...

Light + Carb...ide + Water —

Once in the ...ygen is used ... and other ...nals nee... respire ...cons... decom... an...

All ani... and ... to repli... e. F... through... day, ... producin... de, w...

during photosynthesis.

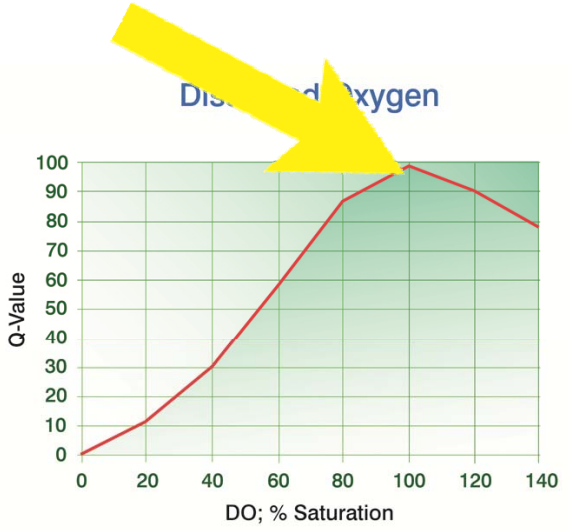
The amount of oxygen required varies according to species and stage of life. DO levels below 3 ppm are stressful to most aquatic organisms. DO levels below 2 ppm or 1 ppm will not support fish; levels of 5 to 6 ppm are usually required for growth and activity. Fish and invertebrates that can move will leave areas with low dissolved oxygen and concentrate in areas with higher levels. Slow moving, trapped or non-mobile aquatic animals may perish if the dissolved oxygen falls below 2 ppm.

Percent Saturation

The oxygen level of a water system is not only dependant on production and consumption. The potential dissolved oxygen capacity of water is limited by atmospheric pressure (altitude), salinity, and temperature. These factors determine the highest DO level possible. The percent saturation value expresses the quantity of dissolved oxygen in the sample as a percent of the theoretical potential.

When water holds all of the dissolved oxygen that it can hold at a given altitude, temperature, and salinity, it is said to be 100% saturated. If it holds a quarter as much as it could possibly hold under those conditions it is 25% saturated. It is possible to get percent saturation values over 100% when water becomes highly aerated by tumbling over rapids and dams. It can also become supersaturated on a sunny day when dense areas of plants and algae produce oxygen through photosynthesis. During dry seasons water levels ...

LaMotte
Dissolved Oxygen
Code 5860-01
Sulfuric Acid 1.1
Starch Ind
Manganous Sulfate
Thiosulfate 0.025N
WATER SAMPLING BOTTLE
Alk Pot Iodide Azide



Dissolved Oxygen

100%

Q=99

Change in Temperature
0.5°C
Q=90

Biochemical Oxygen Demand
16.8 mg/L
Q=15

Coliform
500,000 CFU/100 mL
Q=2

Students enter test results on the Field Data Sheet and the Water Quality Index Worksheet.

Water Quality Index Worksheet

Parameter	Test Result	Units	Q-value	Weighting Factor	Weighted Q-Value
DO	100	% Saturation	99	0.17	16.8
Fecal Coliform	500,000	CFU/100 mL	2	0.16	0.3
BOD	16.8	mg/L	15	0.11	1.7
pH		pH units		0.11	
Temp Change	0.5	°C	90	0.10	9.0
Nitrate		mg/L NO_3	53	0.10	
Phosphate		mg/L PO_4	72	0.10	
Turbidity		NTU	57	0.08	
TDS		mg/L	71	0.07	

Water Quality Index = _____

Water Quality Rating = _____

WQI Rating	
WQI	Rating
0-25	Poor
26-50	Fair
51-70	Average
71-90	Good
91-100	Excellent

MISSING DATA!

BECOME THE STUDENTS!

TEST THE WATER SAMPLES FOR THE REMAINING TEST FACTORS.

Water Quality Index Worksheet

Parameter	Test Result	Units	Q-value	Weighting Factor	Weighted Q-Value
DO	100	% Saturation	75	0.17	16.8
Fecal Coliform	500,000	CFU/100 mL	2	0.16	0.3
BOD	16.8	mg/L	15	0.11	1.7
pH		pH units		0.11	
Temp Change	0.5	°C	90	0.10	9.0
Nitrate		mg/L NO_3		0.10	
Phosphate		mg/L PO_4		0.10	
Turbidity		NTU		0.08	
TDS		mg/L		0.07	
				Water Quality Index =	
				Water Quality Rating =	

WQI Rating	
WQI	Rating
0-25	Poor
26-50	Fair
51-70	Average
71-90	Good
91-100	Excellent

1. Follow the Field Test Procedure to test the water sample from the site.

2. Enter the test result on the Field Data Sheet.

MEASURE
NITRATE

WARNING! This set contains chemicals that may be harful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

For Use with: LaMotte Nitrate Nitrogen Tablet Kit (Code 3354-01). See Resources for links to complete test kit instructions and chemical reactions

Nitrogen is required by all living animals and plants to build protein. Aqu
or they eat other aquatic organisms that consume aquatic plants. Nitroc
decomposition of plants and animals or the excrement of living animals
amount of nitrogen in areas where they are plentiful.

Nitrogen is a nutrient that acts as a fertilizer for aquatic plants and, alon
causing water quality problems.

Drinking water containing high nitrate levels can affect the ability of bloc
animals are especially susceptible.

Nitrogen enters the water from improperly functioning septic systems, a
of fertilizer from lawns and crops.

Unpolluted waters generally have a nitrate-nitrogen level below 1 ppm. I
are considered unsafe for drinking water.

Nitrogen occurs in natural waters as nitrate (NO_3), nitrite (NO_2), Ammoni
results are expressed as nitrate-nitrogen (NO_3-N), meaning "nitrogen tha
expressions refer to the same chemical but express the concentration ir

MATERIALS

Nitrate Nitrogen Tablet Kit	Code 3354-01
Water collection bottle, at least 1 liter	
Thermometer	Code 1066
Field Data Form	
Water Sampler (optional)	Code 1054-DO

SAFE

- •
- •
- •
- •

MEASURE
TURBIDITY (TOTAL SUSPENDED SOLIDS-TSS)

WARNING! This set contains chemicals that may be harful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

For Use with: LaMotte Turbidity Kit (Code 7519-01) or LaMotte Secchi Disk (Code 0171-CL)(alternative method). See Resources for link to complete test kit instructions.

Turbidity is a measurement of the relative clarity of water. Turbidity is caused when suspended solids scatter light as it passes through water. Turbidity should not be confused with color, since darkly colored water can still be clear and not turbid.

In addition to blocking out the light needed by submerged aquatic vegetation, burying eggs and bottom dwelling creatures, suspended sediment can carry nutrients and pesticides throughout the water system. High levels of turbidity can damage gills and interfere with the ability of fish to see food. Suspended particles near the water surface absorb additional heat from sunlight, raising surface water temperature.

There are many possible sources of turbidity. Sediment from disturbed or corroded soil can cloud water and microscopic plankton contribute to high turbidity levels when their numbers increase due to excess nutrients and sunlight. Waste discharge, urban runoff, and large quantities of bottom feeders or boat traffic that stir up bottom sediment can increase turbidity levels.

Turbidity can be measured in several ways. One method uses a turbidimeter-- an instrument that electronically measures how light is scattered when it passes through a water sample. The more light that is scattered, the greater the turbidity reading will be.

The Secchi Disk provides a very simple means of making transparency determinations in natural waters. The Secchi Disk is a black and white circular plastic plate, 20 cm in diameter that is divided into four pie-shaped quadrants that are alternately colored black and white. The Secchi disk is lowered into the water until it can no longer be seen. The depth at which it vanishes is measured and recorded. Secchi disks do not work well in shallow waters or in waters where the current is too strong.

For shallower waters, a disappearing dot method can be used. The water sample is added to a tube with a target at the bottom. A calibrated turbidity standard is added to clear water in a second tube until the observed "fuzziness" of both targets is the same.

Moderately low levels of turbidity may indicate a healthy, well-functioning ecosystem in which plankton flourish at a reasonable level to form the foundation of the food web. High turbidity is an indicator of either runoff from disturbed or eroded soil or blooms of microscopic organisms due to high nutrient inputs. Very clear water is typical of the open ocean and oligotrophic lakes, supporting only sparse plant and animal life.

Turbidity levels in drinking water should be less than 0.5 JTU and typical groundwater levels are less than 1.0 JTU.

FIELD COLLECTION

(If using the Secchi disk, go to Alternative Field Collection)

MATERIALS

Turbidity Test Kit	Code 7519-01
Water collection bottle, at least 1 liter	
Thermometer	Code 1066
Field Data Form	
Water Sampler (optional)	Code 1054-DO

SAFETY

- Wear splash-certified safety goggles and gloves.
- Read the labels on all reagents
- Wash hands before and after contacting water samples and performing tests. Poor hygiene is a common reason samples become contaminated.
- In the event of an accident or suspected poisoning, immediately call the Poison Center phone number in the front of your local telephone directory or call a physician. Additional information for all LaMotte reagents is available in the United States, Canada, Puerto Rico, and the US Virgin Islands from Chem-Tel by calling 1-800-255-3924. For other areas, call 813-248-0585 collect to contact Chem-Tel's International access number. Each reagent can be identified by the four digit number listed on the upper left corner of the reagent label, in the contents list and in the test procedures.

Calculate the Water Quality Index

1. Pool group data to complete the Water Quality Index Worksheet.

2. Set up a spreadsheet, use the Water Quality Index Calculator, or use the Water Quality Index Worksheet calculate the Water Quality Index.

Water Quality Index Calculator

Parameter	TEST RESULT	Units	Q-value	Weight	Weighted Q-value
DO		% Saturation	NR	0.17	NR
Fecal Coliform		CFU/100 mL	NR	0.16	NR
BOD		mg/L	NR	0.11	NR
pH		pH units	NR	0.11	NR
Temp Change		°C	NR	0.10	NR
Nitrogen		mg/L NO_3	NR	0.10	NR
Phosphate		mg/L PO_4	NR	0.10	NR
Turbidity		JTU or in/ft	NR	0.08	NR
TDS		ppm	NR	0.07	NR
			WEIGHTS:	0	0.00
NR = Not Reported			Water Quality Index =		NR
			Water Quality Rating =		NR

WHAT IS THE WATER QUALITY OF THE LOS ANGELES RIVER BETWEEN WARDLOW ROAD AND WILLOW ROAD?

WHAT COULD HAVE INFLUENCED THE WATER QUALITY?

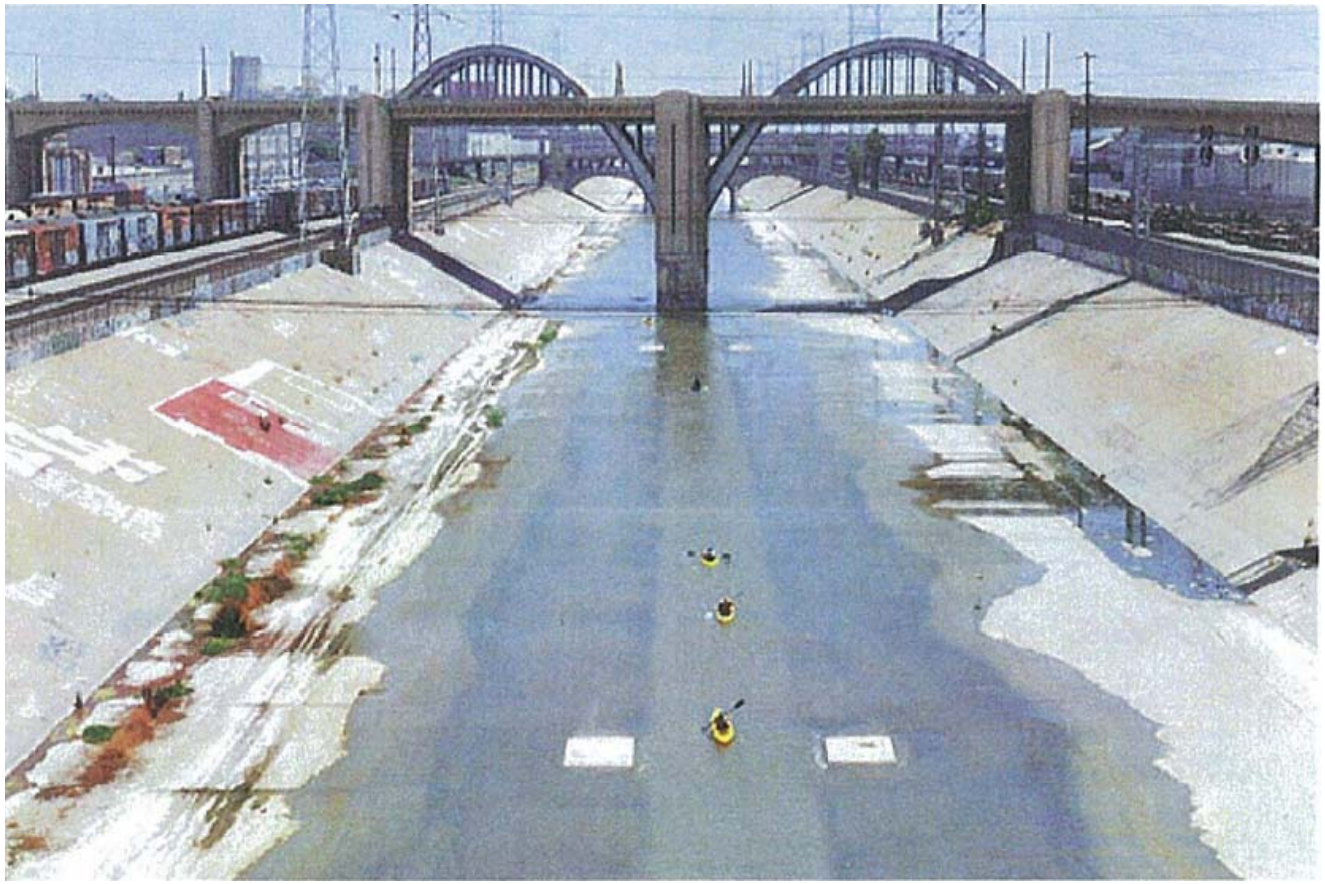
Rainfall?

Restricted water flow?

Sewer and industrial wastewater discharge?

Urban runoff?

When you drive over the Los Angeles River and through the city of Long Beach will you look at the area the same way as you would have 90 minutes ago?



The concentrations of water sample parameters, physical data, and pollution sources used in the example activity were based on actual data that was collected from the Los Angeles River between Wardlow Road and Willow Street on October 11, 2012

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